

EXECUTIVE SUMMARY

BACKGROUND

This Environmental Impact Statement examines and analyzes the environmental impacts associated with the proposed development and operation in the State of New Mexico of the Southwest Regional Spaceport (SRS), a facility for launching commercial space vehicles. The document is required as part of the process of licensing the SRS by the U.S. Department of Transportation (DOT), Federal Aviation Administration (FAA), Office of the Associate Administrator for Commercial Space Transportation (AST). 49 U.S.C. Subtitle IX, ch 701, formerly the Commercial Space Launch Act (CSLA) of 1984, authorizes the Department of Transportation (DOT) to license and otherwise regulate the operation of commercial space launch sites in the U.S. and those operated by U.S. citizens abroad. DOT is to encourage, facilitate, and promote commercial space launches and take actions to facilitate private sector involvement in building and operating a space launching infrastructure. DOT carries out its licensing authority consistent with public health and safety, safety of property, and national security and foreign policy interests of the United States.

PURPOSE AND NEED

For this EIS, the proposed Federal action is the licensing of an entity to operate an installation at a site located in Sierra and Doña Ana counties, New Mexico, that will provide the facilities for launching and recovering space vehicles. Under the CSLA, an FAA license is required to operate a launch site. The underlying need for the proposed SRS is to develop and operate an inland spaceport in New Mexico from which to launch and recover commercial space vehicles that would be used to fulfill a wide range of scientific and industrial missions. A correlated need is to enhance economic development opportunities in New Mexico through the generation of aerospace activities associated with the proposed SRS.

PROPOSED ACTION AND ALTERNATIVES

The State of New Mexico proposes to construct and operate the SRS for use by private companies conducting commercial space activities and operations. The SRS is intended to support the launch and recovery of fully reusable space vehicles or RLVs. Expendable launch vehicles (ELVs) would not be used. Subsection 2.1.1.1, beginning on page 15, contains definitions of RLVs and ELVs. The SRS would

1 provide support for a full range of mission types including satellite launches and recoveries, scientific
2 research, and space station support.

3 The FAA would license the SRS as a commercial launch site. Separately, it would license the users who
4 propose to conduct launch operations at the site and would register the objects launched into space. The
5 SRS conceptual design includes an airfield for logistical support and possible use in landing RLVs. The
6 FAA would require notice of intent to construct the airfield.

7 Commercial RLVs would be launched, achieve orbit, perform their orbital mission, reenter the
8 atmosphere, and land. The vehicles would not have an on-board crew. It is expected that the vehicles
9 would be serviced and prepared for a mission, fly the mission, land, and begin the cycle for the next
10 mission much like aircraft. Any RLV that would be operated from the SRS would be a reusable, highly
11 reliable, operationally safe vehicle with state-of-the-art flight systems. The vehicles would have the
12 capability to terminate each flight without damage, including the ability to make a fully controlled soft
13 landing under emergency conditions. No spent stages or other components would be dropped off
14 during normal flight.

15 The SRS is proposed to be located in south-central New Mexico in an area between Truth or
16 Consequences and Las Cruces in Sierra and Doña Ana counties. The eastern SRS boundary would be
17 contiguous with White Sands Missile Range (WSMR), and the western boundary would be
18 approximately 16 miles east of Interstate 25. The technical process for determining the location of the
19 proposed SRS was accomplished through three separate studies. The first two were grant programs
20 funded by the National Aeronautics and Space Administration and the U.S. Air Force. The third was
21 a study performed by WSMR for the U.S. Army. Initial consideration was given to sites throughout the
22 southwestern United States. The SRS site proposed and evaluated in this document was selected because
23 it is superior to the other candidate sites with respect to

- 24 • population density
- 25 • land use, ownership, and accessibility
- 26 • orbital insertion physics
- 27 • access to airspace
- 28 • lack of obvious environmental constraints

1 The proposed SRS would cover 247,398 acres, or approximately 387 square miles, that currently is
2 under the following ownership:

- 3 • Federal public land: 189,209 acres (76.5%)
- 4 • Private land: 6,767 acres (2.7%)
- 5 • New Mexico State Trust Land: 51,422 acres (20.8%)

6 Only about 27 square miles of the land would be required for exclusive SRS use. The remainder would
7 continue to be managed by the New Mexico State Land Office (NMSLO) for multiple uses except
8 during brief periods when it would be closed for launch or landing safety. It is intended that all of the
9 land within the proposed SRS boundaries would be acquired by the State of New Mexico. The NMSLO
10 would exchange other New Mexico Trust Land for Federal land within the SRS currently managed by
11 the Department of Interior Bureau of Land Management (BLM). Private land required for SRS
12 development would be acquired by direct purchase or other transfer mechanism. The present land
13 owners would receive adequate, negotiated compensation. Existing land uses such as ranching and
14 recreation would continue with only minor interruptions. The existing relationship between the NMSLO
15 and WSMR regarding the Western WSMR Call-Up Area will not be changed.

16 The land area available would allow space vehicles to ascend and return for landing within the proposed
17 SRS boundaries. Operational procedures would establish a control zone around the launch and landing
18 areas similar to a commercial airport control zone. It is anticipated that the control zone would be a
19 cylinder 10 miles in diameter around each launch/landing site, with an upper limit of 60,000 feet above
20 sea level.

21 The Launch Site Safety Operations Document, a document to be developed in accordance with FAA
22 regulatory requirements, would govern how the facility would be operated to protect public safety and
23 safety of property. The Operations Environmental, Safety, and Health Manual would be used to ensure
24 that safety, health, and environmental regulations and standards would be addressed. The SRS Launch
25 Operator's Manual would define the safety interface procedures between the SRS and a launch operator
26 and would define the types of flight safety data and safety preparations that would be acceptable to the
27 SRS.

28 Major components of the proposed SRS would include

- Spaceport Central Control Facility, which would include facilities for administration, maintenance support, logistics support, mission planning, flight operations, ground operations, and vehicle/payload operations
- An airfield capable of handling large cargo aircraft, commercial aircraft, RLVs that land horizontally, winged reentry vehicles, and helicopters.
- A Maintenance and Integration facility to be used for payload-processing and for space vehicle repair and maintenance, assembly, ground testing, and some parts manufacturing
- A launch/landing complex consisting of three proposed launch/landing pads
- The Flight Operations Control Center that would be used for flight operations of particular spacecraft
- A cryogenic fuel plant to manufacture and store the liquid hydrogen and liquid oxygen propellants necessary to support up to 30 launches per year

Approximately 115 acre-feet of water per year would be required during construction, and approximately 1,200 acre-feet per year would be required to operate the SRS and the cryogenic fuel plant. Twelve hundred (1,200) acre-feet per year is the normal allocation for irrigation of 400 acres of agricultural land. Water requirements would be met by local water wells during construction and early operations. Surface water supplies from Elephant Butte Reservoir would supply water for the cryogenic fuel plant. Rights to the required water would be obtained through purchase, exchange, or other means. Water for SRS purposes would be made available only if water rights could be acquired and present water users were not adversely affected.

Electrical power, water, propane or natural gas, waste disposal, sanitary sewers, and wastewater treatment would be provided. SRS development would require peak electrical power of 40 megawatts (MW). A new 40-kV overhead transmission line would be constructed. A natural gas pipeline would be constructed to meet long-term needs.

Other alternatives considered were

- No Action Alternative. Under this alternative, the SRS would not be constructed nor operated at the proposed site. Current land uses would continue indefinitely. Management of approximately 189,000 acres of Federal public land would remain under the jurisdiction of the BLM and be subject to existing BLM Resource Management Plans (RMPs)

- Minimal SRS Infrastructure Alternative. Under this alternative, construction of SRS facilities would be kept to a bare-bones minimum. The footprint of disturbed land would be similar to that under the proposed action. Trailers or temporary modular structures would be used for many facilities. The cryogenic fuel plant would not be constructed, although the cryogenic storage facilities would be built. The natural gas pipeline would not be constructed, and water would be obtained from groundwater sources through domestic wells. The proposed water pipeline would not extend to the Elephant Butte Reservoir area. Any required water purification would be performed by small, centrally located filtration units. On-site portable generators would replace the main transmission line. Paving of the infrastructure support roads would be limited.

AFFECTED ENVIRONMENT

The proposed SRS is located in the south-central portion of the Jornada del Muerto Basin. This is a region characterized by broad desert basins and discontinuous mountain ranges. The basin has no surface water outlet, but groundwater can exit into the Rio Grande approximately 15 miles to the west. Soils generally are well drained and are composed of gravels, sands, sandy and loamy silts, and clays. Organic matter in these soils is low. There is no farmland under cultivation within the boundary of the proposed SRS site. The major current use of the land is ranching. There is no current production of minerals or energy resources, and little potential for their development.

There is no perennial surface water in the vicinity of the proposed SRS. Ephemeral surface water is derived from precipitation and storm-water runoff from the mountains and is collected in surface dirt tanks and transient ponds in dry watercourses and arroyos. Water from the underground aquifers is of poor quality because of high dissolved solids and most is nonpotable.

The proposed SRS site has relatively mild winters with hot summers. The heaviest rainfall occurs in the summer months. Average annual rainfall is about 9 inches, with about half the total occurring during July and August. Most common wind directions are south and southwest, and the strongest winds occur in the late winter and spring. In a typical year, the 27 sections of land that would make up the core SRS area would be expected to receive up to 350 lightning strikes. The air quality at the proposed SRS area is in attainment for all national and New Mexico air quality standards.

1 The site contains diverse wildlife and vegetation communities. Extensive biological surveys have
2 demonstrated the presence of 115 animal species. These surveys have demonstrated that the site
3 contains no Federal or New Mexico listed endangered or threatened plant species. Fifteen special
4 interest or protected animal species were found on the proposed SRS site. These included one Federal
5 candidate, three Federal Species of Concern, and one New Mexico Threatened species. The balance of
6 the observed special interest species included raptorial birds and one species of horned lizard.

7 A field archaeological survey of the proposed SRS study was conducted during 1995 and 1996 covering
8 4,027 acres encompassing the area affected by the proposed construction of facilities. One-hundred
9 twenty-five (125) cultural resource sites were found, some of which could be subjected to disruption
10 by the proposed action. These included previously identified and newly discovered sites. Sites with
11 Paleoindian, Archaic, Mogollon, Apache, Hispanic, and Euro-American as well as unknown cultural
12 affiliation were found. All 125 sites are classified as potentially eligible for listing and are protected by
13 the National Historic Preservation Act. No sites listed in the 1996 National Register of Historic Places
14 or the New Mexico Register of Cultural Properties are situated within the proposed SRS site.

15 The location of the proposed SRS is very quiet because it is a rural area where the major human activity
16 is ranching. Existing noise sources have been characterized and measured using standard measurement
17 techniques and instrumentation. Using these measurements, at locations more than 50 feet from the
18 roads and railroad, the average noise level was estimated to be 40 dBA and dominated by natural noise
19 sources. This level is typical of rural areas.

20 Most of the land currently is managed by the Bureau of Land Management. A smaller amount is New
21 Mexico Trust Land managed by the New Mexico State Land Office, and a fraction is privately owned.
22 Under the proposed action, the New Mexico State Land Office would manage the entire SRS and would
23 lease it to the New Mexico agency in charge of the SRS. The aesthetic character within the proposed
24 SRS area is neither unique or uncommon for southern New Mexico. A variety of dispersed recreational
25 activities take place in the area including hunting, hiking, rockhounding, off-road vehicle use, bird-
26 watching, equestrian activities, and astronomy. Hunting is the most widespread dispersed recreation use.

27 Data indicate that region surrounding the proposed SRS is below the state average in income. For 1990,
28 Sierra County reported a median household income 35.2% below the State average with 19.0% of the

1 population living at or below the poverty level. Doña Ana County reported a median household 9.2%
2 below the State average with 25.6% of the population was living in poverty. The 1990 Census lists Sierra
3 County's non-Hispanic white population at 74.9% with Hispanics making up 23.9% of the county's
4 population. By contrast, the 1990 Census reports a 40.6% non-Hispanic population for Doña Ana
5 County with Hispanic making up 56.3% of the county total. Housing is generally available and
6 affordable. Both Las Cruces and Truth or Consequences are classified by the FBI as underserved with
7 respect to police protection. Schools are generally at capacity. Medical facilities are generally adequate
8 to satisfy current requirements. Memorial Medical Center in Las Cruces is equipped with a helipad, but
9 it is not a designated trauma center and severely injured patients normally are transported directly to
10 Albuquerque or El Paso. Ground transportation is generally adequate. Although Las Cruces has the
11 nearest commercial airport, El Paso International Airport is the closest full-service commercial airport.

12 *ENVIRONMENTAL CONSEQUENCES*

13 The major issues associated with the proposed action are public health and safety; occupational worker
14 health and safety; cultural (archaeological and historic) resources; endangered, threatened, or sensitive
15 species; land ownership and use; and socioeconomic impacts. Potential impacts of the proposed SRS
16 on other environmental attributes are of only minor importance.

17 For the construction phase, risks would be typical of construction projects and routine for construction
18 workers. The public would not be subjected to health and safety risks as a result of construction. For
19 the operation phase, risks to workers associated with all activities would be comparable to the risks
20 resulting from similar activities taking place at other types of facilities. It is anticipated that risks to the
21 public associated with operation of the SRS, including those associated with launching and landing space
22 vehicles, would be comparable to or less than other risks to which people living near the facility and
23 along flight paths are routinely subjected. No non-Federal government mission would be approved for
24 launch from the SRS unless acceptable safety criteria were met as established by FAA/AST. Risks would
25 be similar under the minimal infrastructure alternative, except that cryogenic fuels would be transported
26 by truck thereby subjecting the public to only a small risk associated with traffic accidents.

27 Under the proposed action, the SRS would consume approximately 1,200 acre-feet of water per year.
28 The primary source of water would be from Elephant Butte Reservoir through acquisition of sufficient
29 water rights. Water rights for 2,000 acre-feet would be acquired, which would represent only 0.6% of

1 the normal annual release of 323,600 acre-feet from the Reservoir. Groundwater from wells within the
2 proposed SRS would be the backup source. There would be no net effect on regional water supply, and
3 there would be no detrimental effect on other water resources from the facility because water would
4 become available only through purchase of existing water rights in accordance with New Mexico water
5 law. No new water allocation would be requested. Under the minimal infrastructure alternative, the
6 cryogenic fuel plant would not be built, and water for the SRS facilities would be provided from on-site
7 groundwater sources. There would be no significant effect on regional aquifers at the projected pumping
8 rate.

9 Air quality effects of both construction and operation of the proposed SRS would be minor. None of
10 the pollutants released would have the potential to cause nonattainment of National or New Mexico
11 Ambient Air Quality Standards. During construction, release of fugitive dust would be significantly
12 reduced through an aggressive dust control program.

13 Construction and operation of SRS facilities and connecting roadways under the proposed action would
14 not pose a direct or indirect threat to any of listed or protected plant or animal species. For some
15 species, alteration or direct loss of wildlife habitat associated with construction activities could result in
16 loss of hunting, roosting, perching, foraging, and territorial display sites. This would be offset by the
17 construction of raptor-electrocution-proof utility lines. Potential noise impacts on wildlife do not appear
18 to represent a survival threat to any species of wildlife. There may be a temporary adjustment period
19 for some individual animals, and some animals may be driven from particularly noisy areas, but the loss
20 of habitat would be a small fraction of suitable habitat in the area. Under the minimal infrastructure
21 alternative, most effects would be similar. Because the cryogenic fuel plant would not be constructed,
22 there would be no noise effects from it.

23 Approximately 54 archaeological sites would be directly impacted by the proposed action. Aggressive
24 actions would be taken to minimize the effects on these sites. Consultation with the Mescalero Apache
25 Tribe in Mescalero, New Mexico, was initiated on January 30, 1997, in order to comply with the
26 American Indian Religious Freedom Act and the Native American Graves Protection and Repatriation
27 Act. The official response from the tribe—dated April 10, 1997—does not identify any Traditional
28 Cultural Properties within the proposed SRS boundaries (copy of letter is in Appendix B). Under the
29 minimal infrastructure alternative, impacts to cultural resources would be similar.

Space vehicle launches, sonic booms, and airfield operations would be the noise sources at the proposed SRS that would have the widest effects. Vehicular traffic and the cryogenic fuel plant would affect small areas around the roads and the plant. Launch noise and aircraft noise would be comparatively minor in nearby communities. Sonic boom noise would affect downrange areas, but it would be very unlikely to cause physical damage or to result in significant public complaints. Effects of the minimal infrastructure alternative would be similar except that there would be no noise from the cryogenic fuel plant.

Visual and recreational resources would be degraded somewhat under either the proposed action or the minimal infrastructure alternative, but the effects would be small. Socioeconomic impacts would be positive. Either the proposed action or the minimal infrastructure alternative would increase employment opportunities in the area, but would not increase the demand for public services beyond the current capacity.

Cumulative effects of the proposed SRS would not lead to collectively significant impacts to any of the environmental attributes analyzed in this document. Impacts of the proposed SRS would not fall disproportionately on low income or minority populations.

A summary of the comparative environmental effects of the proposed action and the two alternatives (no action and minimal infrastructure) is provided in Table 55, page 301.

MITIGATION

Extensive mitigation measures would be used to minimize impacts of the construction and operation of the proposed SRS.

Measures employed during construction include

- Fugitive dust generated by construction would be minimized with an aggressive dust control program.
- Cultural resources and sensitive species surveys would be completed prior to any land disturbing activities. Whenever possible, the SRS facilities, roads, and rights-of-way would be situated to avoid archaeological sites. Archaeological sites would be protected by fencing or other appropriate means. If archaeological sites located during the preconstruction Class III surveys

could be avoided, a determination of eligibility to the National Register of Historic Places would be made by the BLM or the NMSLO in consultation with the State Historic Preservation Officer. Guidance from the Preservation Officer would be used to prepare a specific mitigation action plan for each eligible site. If cultural resources were uncovered during excavation, work would be stopped until a qualified archaeologist assessed the site. If the archaeologist determines that the resource is potentially significant, in accordance with the final Programmatic Memorandum of Agreement, the State Historic Preservation Officer and NMSLO would be notified. Construction in the area of the site would not resume until approved by the regulatory and management agencies. Facilities would be sited and operations would be planned to minimize visual and noise impacts of SRS activities to El Camino Real.

- Discovery of previously unknown Federal or State protected biological resources would be managed in the same manner as cultural resources through the U.S. Fish and Wildlife Service and appropriate New Mexico agencies.
- OSHA regulations would be strictly complied with to protect construction workers.
- Disturbed areas would be recontoured and revegetated as soon as possible either during or immediately following construction.
- Visual effects would be reduced by selection of an appropriate architectural style and by selection of colors and textures of facilities designed to blend with their surroundings.

Measures that would be employed to reduce impacts during operation include

- All space vehicle launches and missions would be licensed by the FAA/AST in accordance with its mission of protecting public health and safety unless exempt from CSLA licensing requirements. Flight path restrictions would be used if the vehicle reliability alone could not ensure acceptable risk to the public.
- Workplace hazards identified in a job-hazard analysis would be controlled by development of and strict adherence to occupational safety and health safe operating procedures to be reflected in the LSSOD and the ES&H Manual.
- Pyrotechnics would be limited to small quantities stored in facilities designed for maximum safety. The public would be protected from high levels of launch noise by exclusion from areas that would be subjected to excessive levels. Workers would be protected by exclusion or by use of hearing protection equipment as appropriate.

- 1 • During operational periods, official and unofficial visitors would be restricted to appropriate
2 areas
- 3 • Water rights required for construction and operation would be acquired without adversely
4 affecting present water users.
- 5 • The water, natural gas, and electrical distribution systems would be placed in the already cleared
6 and disturbed road network within the SRS boundaries.
- 7 • Current land-use patterns including agriculture, mining, and recreation would continue on most
8 of the land with only minor interruptions. Normal recreational activities would be allowed
9 within the safety constraints in joint-use areas.
- 10 • Private land required for SRS development would be acquired by direct purchase or other
11 transfer mechanism. The present land owners would receive adequate, negotiated compensation.
- 12 • Federal and State sensitive plant species and sensitive habitat would be avoided where possible.
13 If isolated sensitive plants were found in areas to be disturbed individual plants would be
14 transplanted to suitable habitat outside the area of disturbance. Federal and State sensitive
15 wildlife species would be avoided during construction and operation where possible.
- 16 • Raptor nests within 1 mile of projected construction would be destroyed during the winter
17 season preceding construction activities to preclude occupation during the subsequent nesting
18 seasons. All above ground electrical power lines would be constructed or modified using BLM
19 or Raptor Research Foundation, Inc., guidelines to prevent electrocution of raptors.
- 20 • Cultural resources sites (historic and prehistoric) would be protected using measures similar to
21 those used during construction.
- 22 • All hazardous waste management activities and facilities would comply with applicable Federal
23 and State regulations including pollution prevention planning.
- 24 • Appropriate sanitary facilities would be constructed at each work area.
- 25 • No underground storage tanks for petroleum would be constructed for petroleum products
26 during either construction or operation. All petroleum and hazardous materials storage tanks
27 would be installed and maintained according to applicable Federal and State regulations.
- 28 • All facilities and supporting infrastructure would be designed and constructed to the best
29 available technology standards for storm-water runoff control. Activities in areas of high erosion
30 potential would be designed to minimize surface disturbance to the greatest extent possible.
31 Areas of surface disturbance outside the actual facilities or roadway construction areas would
32 be reclaimed.

- Outdoor lighting would be shaded or otherwise designed to maintain a dark sky environment for the benefit of local astronomical observation and to minimize lighting annoyance. Low-pressure sodium vapor fixtures or equivalent fixtures would be used that have permanently-installed shields to direct the illumination downward. Working lights used for night maintenance would be shielded to minimize light pollution.

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